

REMARKS

Applicants respectfully request that the above application be reconsidered, in view of the following remarks. Claims 17-30 and 32-38 are currently pending.

In reviewing the Office Action, it is unclear whether the Examiner has made of record U.S. Patent 6,677,054 (Subramanian) that was cited by Applicants in the Supplemental Information Disclosure Statement (IDS) concurrently filed with the Request for Continued Examination because the SB/08 form attached to the Supplemental IDS is not initialed by the Examiner adjacent the entry of this reference. Accordingly, Applicants respectfully request that the Examiner initial this form as requested and return the initialed copy to Applicants in accordance with MPEP 609 (see page 600-139).

A. Response to Rejection of Claims 17-25, 27-30, 32-35 and 37 under 35 U.S.C. § 103(a) as Unpatentable over Spence et al., in View of Hasz et al.

At pages 3-6 of the Office Action (see section 4), Claims 17-25, 27-30, 32-35 and 37 have been rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 5,324,544 (Spence et al.), in view of U.S. Patent 5,871,820 (Hasz et al.). Briefly, Spence et al. discloses a method for protecting fuel contacting surfaces of a gas turbine engine from carbon deposits by applying a coating of alumina and silica thereto from a sol-gel. See abstract. Briefly, Hasz et al. discloses protecting thermal barrier coatings by using an impermeable barrier coating that is a dense non-cracked, non-porous layer. See abstract and column 2, lines 17-31.

Applicants respectfully traverse this rejection. Contrary to what the Office Action suggests, Spence et al. does not teach or suggest the method of Claims 17-25, 27-30, 32-35 and 37. In particular, Spence et al. does not teach or suggest infiltrating the porous outer layer of the thermal barrier coating with an alumina precursor according to the claimed method. See step 2 of Claim 17. Instead, Spence et al. teaches coating the fuel contacting surface/component with a thin, high temperature resistant layer of alumina and silica deposited from a sol-gel. See column 3, lines 17-22. Nowhere does Spence et al. teach or suggest that the deposited sol-gel infiltrates the fuel contacting

surface/component, much less a porous outer layer of a thermal barrier coating as in the claimed method.

Indeed, as acknowledged at page 4 of the Office Action, Spence et al. does not teach protecting a thermal barrier coating comprising a non-alumina ceramic layer. Instead, the Office Action relies on Hasz et al. to teach protecting a thermal barrier coating from environmental contaminants, and providing a metal substrate with a thermal barrier coating comprising a ceramic layer, such as yttria stabilized zirconia, on a bond coat (referring to the abstract and column 1, lines 19-56). The Office Action also refers to Hasz et al. as teaching depositing the impermeable barrier layer by using sol-gel techniques (referring to column 4, lines 25-30). The Office Action then alleges at page 4 that it would be obvious to modify Spence et al. “to use a protective coating on a thermal barrier coating as suggested by [Hasz et al.] to provide desirable protection from environmental contaminants because [Spence et al.] teaches applying an alumina /silicon coating protects various substrates, including ceramic, from contaminants and [Hasz et al.] teaches thermal barrier coatings , with outer layers of ceramic, benefit from a contaminant protective coating.”

This alleged combination of references is *prima facie* improper because the Office Action has not provided any proper motivation for combining Hasz et al. with Spence et al. See, e.g., *In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) (“teachings of references can be combined only if there is some suggestion or incentive to do so”); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant).

What the Office Action fails to acknowledge is that Spence et al. and Hasz et al. are not directed at protecting against the same or similar environmental contaminants. Spence et al. is directed at inhibiting coke formation on the coating (see column 1, lines 11-13), while Hasz et al. is directed at protecting the coating against infiltration of different environmental contaminants, namely CMAS (see column 1, lines 63-67) and iron oxides (see column 2, lines 32-35). Accordingly, the Office Action has provided no proper “motivation to combine” the teaching Hasz et al. with those of Spence et al.

Even if properly combinable with Spence et al., Hasz et al. still fails to teach or suggest infiltrating the porous outer layer of a thermal barrier coating with an alumina precursor according to the method of Claims 17-25 and 27-31. Instead, Hasz et al., similar to Spence et al., forms an impermeable barrier coating on the thermal barrier coating, whether it be deposited from a sol-gel or otherwise. Nowhere does Hasz et al. teach or suggest that the deposited sol-gel infiltrates a porous outer layer of the thermal barrier coating as in the claimed method.

In fact, the benefit of Hasz et al.'s impermeable coating appears to be to prevent any flow of contaminants into the underlying thermal barrier coating. By contrast, infiltrating alumina within the porous outer layer according to the thermal barrier coating of the instant Claims provides a reservoir of alumina that can react with the contaminants to form a third phase with a higher melting point. This "freezes" the contaminants and does not permit these "frozen" contaminants to further penetrate into the thermal barrier coating, nor go through cyclic liquid-solid-liquid phase transformations that can undesirably stress and crack the thermal barrier coating. Such a benefit for infiltrating alumina within a porous outer layer is not taught at all by Hasz et al., or Spence et al.

Indeed, neither Spence et al., nor Hasz et al., suggest that their respective surface/component or thermal barrier coating are in anyway porous such that the applied coating would inherently infiltrate the surface/component or thermal barrier coating. In fact, Spence et al. and Hasz et al. would suggest just the opposite. Each of these references teach a separate coating layer on top of the respective surface/component or thermal barrier coating. In other words, there is a "clearly defined interface between" the applied coating of Spence et al. and Hasz et al., and the respective surface/component or thermal barrier coating.

In rejecting Claims 29-30, the Office Action concedes that Spence et al., even in view of Hasz et al., fails to teach the claimed period of time for treating the outer layer. Instead, the Examiner takes the position that the "length of treatment" is "a result effective variable" and therefore obvious. The Examiner's position is simply unsupportable and improper speculation. The cited case law regarding selecting "optimum values" is irrelevant because, as even the Examiner concedes, no time periods

are taught by the art relied on. See last paragraph of page 5 of the Office Action. Accordingly, there is no a proper basis for rejecting Claims 29-30 under 35 U.S.C. § 103(a) as unpatentable over Spence et al. in view of Hasz et al. If the Examiner wishes to persist in this position regarding Claims 29-30 that is not supported by the art relied on, Applicants respectfully request that he provide an affidavit/declaration under 37 CFR 1.104(d)(2) to support what appears to be a belief based on his own personal knowledge.

In rejecting Claims 32-35 and 37 as unpatentable over Spence et al., in view of Hasz et al., the Office Action also violates 37 CFR 1.104(c)(2). Specifically, the Office Action never says or identifies where Spence et al. or Hasz et al., separately or in combination, teach or suggest the turbine component is in an assembled state when the porous outer layer is treated with the liquid composition according to Claims 32-35 and 37.

For at least the foregoing reasons, the method of Claims 17-25, 27-30, 32-35 and 37 is unobvious over Spence et al., even in view of Hasz et al..

B. Response to Rejection of Claims 26 and 37 under 35 U.S.C. § 103(a) as Unpatentable over Spence et al., in View of Hasz et al., and Further in View of Ceramics and Glasses

At pages 6-7 of the Office Action (see section 5), Claims 26 and 27 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Spence et al., in view of Hasz et al., and further in view of pages 11, and 752-53 from Volume 4 of the Engineered Materials Handbook (Ceramics and Glasses). Briefly, page 752 of Ceramics and Glasses discloses that: (1) a number of transitional alumina structures can form initially with increasing temperatures, but all structures are transformed irreversibly to alpha alumina with a corundum structure of a hexagonal system; and (2) alpha alumina is the only stable form above 1200°C (2190°F).

Applicants respectfully traverse this rejection for at least the same reasons why Claims 17-25, 27-30, 32-35 and 37 are unobvious over Spence et al., in view of Hasz et al. In addition, Ceramics and Glasses does not teach or suggest that the alpha alumina formed would be finely divided, as defined in Claims 26 and 37. Indeed, the Office

Action fails to even address where the Ceramics and Glasses teaches or suggests that the alpha alumina formed would be finely divided.

The suggestion at page 7 of the Office Action that thermally converted aluminum alkoxide to alpha alumina “must necessarily result in finely divided alpha alumina” improperly relies on what the above application teaches, and not what Ceramics and Glasses or any of the other art relied on teaches. Without any support in the art relied on, the Office Action at page 7 further incorrectly and improperly suggests that either: (1) the above application and the art have different definitions for alpha alumina thermally converted from aluminum alkoxide; or (2) Claims 26 and 37 are using other processing steps or parameters that are not in these Claims. If the Examiner wishes to persist in this position that is unsupported by the art relied on, Applicants respectfully request that he provide an affidavit/declaration under 37 CFR 1.104(d)(2) to support what appears to be a belief based on his own personal knowledge.

Moreover, because Spence et al. and Hasz et al. fail to teach or suggest infiltration of the alumina within a porous outer layer of a thermal barrier coating, the combination of Ceramics and Glasses with these other two references still fails to teach or suggest the method defined in Claims 26 or 37.

For at least the foregoing reasons, the method of Claims 26 and 37 is unobvious over Spence et al., in view of Hasz et al., even when considered in view of Ceramics and Glasses.

C. Response to Rejection of Claims 32 and 38 under 35 U.S.C. § 103(a) as Unpatentable over Rigney et al. in view of Spence et al. and in View of Hasz et al.

At pages 7-8 of the Office Action (see section 8), Claims 32 and 38 have been rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 6,274,193 (Rigney et al.), in view of Spence et al., in view of Hasz et al. Briefly, Rigney et al. discloses a method for restoring a protective coating including a metallic environmental resistant coating, having a coating total thickness within a coating design thickness range, on a

metal substrate of an article that has experienced service operation. See column 2, lines 17-21.

The Office Action relies on Rigney et al. to allegedly teach repairing a damaged turbine component, removal of the entire thermal barrier coating, repairing the metal component at the discrete location of the damage and finally reapplying the thermal barrier coating to outside of the refurbished turbine component (referring to the abstract). Page 7 of the Office Action concedes that Rigney et al. fails to teach applying an alumina coating to protect the component against environmental contaminants. Instead, the Office Action alleges that it would be obvious to modify Rigney et al. to apply the protective coating to the thermal barrier coating of a refurbished turbine component as suggested by Spence et al. in view of Hasz et al. to provide “desirable protection of a thermal barrier coating for a turbine component because [Spence et al.] in view of [Hasz et al.] discloses a protective coating applied to a thermal barrier coating is known in the art to provide protection against contamination and therefore would reasonably be expected to effectively provide a refurbished turbine component with [an] outer thermal barrier coating with protection against contaminants.”

Applicants respectfully traverse this rejection for at least the same reasons why Claims 17-25, 27-30, 32-35 and 37 are unobvious over Spence et al., in view of Hasz et al. Applicants are puzzled as to why Claim 32 has also been rejected under 35 U.S.C. § 103(a) as unpatentable over Rigney et al. in view of Spence et al., in view of Hasz et al. Only Claim 38, not Claim 32, specifically defines step (1) as providing a refurbished thermal barrier coating that overlays the metal substrate of the turbine component.

In addition, rejecting Claims 32 and 38 over this combination of references is *prima facie* improper because the Office Action has not provided any proper motivation for combining Spence et al and Hasz et al., with Rigney et al. *See, e.g., In re Fine*, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) (“teachings of references can be combined only if there is some suggestion or incentive to do so”); *In re Dance*, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant).

In particular, the Office Action has alleged no proper basis for why one skilled in the art would be motivated to use alumina in the repair process of Rigney et al. based on what Rigney et al. would suggest. The motivation put forth by the Office Action for using alumina in the Rigney et al repair process is based on what Spence et al. and Hasz et al. allegedly desire for a protective coating for a component, and not what the primary reference, Rigney et al., would suggest to one skilled in the art would be a desirable material for repairing a damaged section of a coating. In fact, Rigney et al. suggests a distinct preference for a different type of coating for its repair process, namely a diffusion aluminide coating or an overlay coating, neither of which is the same or similar to alumina. See column 3, lines 50-58 of Rigney et al. Why one skilled in the art would be motivated to select alumina over these other coating materials taught for use in the Rigney et al repair process for the purposes set forth by Rigney et al. is never addressed by the Office Action.

For at least the foregoing reasons, the method of Claims 32 and 38 is unobvious over Rigney et al., even in view of Spence et al., in view of Hasz et al.

D. Conclusion

In conclusion, Claims 17-30 and 32-38 are unobvious over the prior art relied on in the Office Action. Accordingly, Applicants respectfully request that Claims 17-30 and 32-38 be allowed to issue in the above application.

Respectfully submitted,

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